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EVEN PAGES ARE MISSING**

# APPENDICES TO THE EIS

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~~B .....o Screening of Alternatives to Abate PCB Contamination in Waukegan Harbor and Environmental Assessment of Lagoon Construction~~

~~C .....o Finding of No Significant Impact~~

**B** .....o Data on Surveys of Surface Water and Sediment PCB Contamination in the Waukegan Vicinity

**C** .....o A Status Report on the Presence of PCB's in the Fishes of Lake Michigan with Special Reference to the Waukegan Harbor Area PCB Contamination

**D** .....o Symptoms of "Yusho Disease"

~~E .....o Methodology for the Selection of New Landfill Site Options in Lake County Illinois~~

**E** .....o Methodology for the Selection of New Landfill Site Options in Lake County Illinois

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**N** .....o Literature Review on Aquatic Biota of the Waukegan Coastal Zone and Experimental Findings to Supplement the Needs Documentation.

**O** .....o List of Employers in the Waukegan Harbor Vicinity

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- This is not the Specimen Summary -

### Summary

Polychlorinated biphenyls (PCBs) are chemical compounds that belong to the broad family of organic chemicals known as chlorinated hydrocarbons. The properties of PCBs include good chemical and thermal stability, non-conductivity, and low solubility in water. These properties resulted in the widespread use of PCBs in transformers and capacitors, and as hydraulic fluids, heat transfer fluids and plasticizers. Although the manufacture of PCBs was halted in the United States in 1977, uncontained PCBs will persist in the environment for long periods of time because of their stability.

Research carried out to date indicates that PCBs in an uncontained form can result in the following impacts:

- o Direct impacts on the reproductive and growth capabilities of aquatic organisms and terrestrial animals
- o Potential impacts on human health due to consumption of contaminated fish
- o Direct impacts on human health from accidental ingestion of large amounts of PCBs spilled into food or from direct contact with PCBs in liquid or vapor forms.

In 1976 it was discovered that the Outboard Marine Corporation (OMC) was discharging PCBs into Waukegan Harbor and into a ditch and settling pond north of the Harbor. Subsequent investigations have determined that over a million pounds of PCBs are present in the two areas. Nearly 60% of that amount is found in the soils of the North Ditch Drainage System. The remaining 40% is found in the sediments of Waukegan Harbor. Approximately half of the PCBs in the North Ditch Drainage System are located in the soils beneath two ponded areas, the Crescent and Oval Lagoons. The other half is found in the soils of an old settling lagoon, now filled and used as a parking lot, south of the North Ditch. The PCBs deposited in the soils of the parking lot are not in contact with any surface water, however. Over 95% of the PCB mass inside the Harbor is in a small embayment at the north end of the Harbor (Slip #3).

The presence of a large mass of uncontained PCBs in these areas represents an immediate and long term threat to Lake Michigan water quality, fish

The greatest PCB concentrations in the North Ditch Drainage System are in the deep soils beneath the Crescent and Oval Lagoons, at the western or upstream end of the Ditch. The intermittantly flowing waters in the North Ditch also are highly contaminated with PCBs. These waters flow into Lake Michigan at the northern edge of the OMC property, north of Waukegan Harbor.

In general, PCBs enter water bodies from direct discharges or from precipitation as a result of volatilization (that is, exposed PCBs will evaporate, enter the atmosphere, coalesce with water droplets and fall as precipitation). Because PCBs are relatively insoluble, once they enter a water body they tend to become absorbed in organic matter, instead of dissolved in the water. PCBs also are known to accumulate preferentially in the fatty tissues of fish.

Fish monitoring programs conducted in the Great Lakes in the early 1970s indicated that PCB concentrations in coho salmon from Lake Michigan were two to three times greater than PCB concentrations in coho from Lake Huron and approximately ten times greater than PCB concentrations in coho from Lake Erie and Lake Superior. It also has been found that fish inside contaminated Lake Michigan Harbors, including Waukegan harbor, generally are the most highly contaminated of all fish tested in the Lake Michigan basin. Carp captured in highly contaminated harbor environments around Lake Michigan have been found to contain as much as 970 ppm PCB on a whole-body sample basis. Carp captured in open water areas of Lake Michigan have not been found to exceed 28 ppm PCB content.

PCB levels in some Lake Michigan fish appear to have decreased; for example, in 1979 lake trout sampled in open water areas (based on 36 samples) had a median PCB content of less than 5 ppm, compared to a median PCB content of nearly 15 ppm in 1972 (based on 11 samples). However, 25% of all samples of Lake Michigan lake trout taken in 1979 had PCB concentrations that equaled or exceeded 10 ppm. The study of PCB accumulation processes in Waukegan Harbor fishes indicates that small plankton feeding fish and adult bottom feeding fish such as carp will continue to have PCB concentrations in excess of 5 ppm until the PCB concentrations in the water column of Waukegan Harbor are reduced from the present 0.01 ppm to 0.30 ppm range to the 0.01 ppm to

term environmental consequences of taking no action to abate PCB contamination. The consequences of the No Action Alternative document the need for an abatement action. If no action were taken to abate PCB contamination in the project area the following impacts would continue to occur:

- o Fish and other aquatic life inhabiting Waukegan Harbor would continue to be highly contaminated with PCBs.
- o There is a large mass of PCBs in the North Ditch Drainage System and the estimated rate of dispersal is low. Consequently, there would be a lengthy period of time during which it would be possible for animals or people to come into direct contact with PCBs or unknowingly disperse them into the environment.
- o The relative significance of the PCB load to Lake Michigan from the Waukegan area would increase over time because it holds the largest known uncontained PCB mass in the Lake Michigan basin and, in time, other smaller uncontained masses of PCBs now affecting the basin will have dispersed or would have become sequestered in deep lake bed sediments.
- o Routine channel dredging for navigational purposes could not take place and shipping activity that is vital to two Harbor based industries, Huron Portland Cement and National Gypsum, could be halted as a result.
- o The Waukegan Water Filtration Plant maintains an emergency water intake in the Waukegan Harbor. Extra scrutiny would be required for water taken from this intake to ensure that all water delivered through the system has PCB concentrations less than the Federal standard of 1 part per billion (ppb). Other lakefront communities near Waukegan harbor that also rely on Lake Michigan for municipal water supplies; Winthrop Harbor, Zion, North Chicago, Lake Bluff, and Lake Forest, also would be required to use extra scrutiny, and possibly increased treatment, to safeguard public water supplies.
- o Users of the Waukegan Public Beach could come into direct contact with high levels of PCBs under certain hydrologic conditions.
- o The present volatilization rate of PCBs from both areas would continue with the attendant risks associated with continuous public exposure to PCBs over a long period of time.

Several conceptual alternatives for abatement of PCB Harbor contamination were screened for technical and engineering feasibility. Among the alternatives considered were: excavation of Harbor sediments; dredging of Harbor se-

The level of detailed information on the actual distribution and movement of PCB contamination in the North Ditch Drainage System is not yet adequate for the development of final engineering plans for removal of contaminated soils. The project schedule developed thus far provides for the completion of an underground storm water bypass (buried pipeline) as a preparatory step to the excavation of soils in the North Ditch Drainage System. This bypass is necessary to allow dewatering of soils prior to excavation and to halt the present rate of PCB movement into Lake Michigan.

Both segments of the abatement project require the final disposal of PCB contaminated materials. Existing technologies for the final disposal of PCBs include landfilling, incineration, chemical treatment, and biodegradation. A screening of these alternatives indicated that landfilling is the most acceptable means of ultimate disposal. Although long-term storage in a landfill does not destroy the contaminants, the other disposal alternatives involve uncertain technologies, or in the case of incineration, are prohibitively expensive. The risk of offsite movement of PCBs associated with long-term storage in landfills will be minimal with proper landfill design and operation.

Six potential landfill sites were identified: two existing licensed hazardous waste disposal sites; two existing disposal sites that are not licensed for hazardous waste but have the potential to become licensed; and two areas in Lake County that could be developed into new sites. The preferred disposal site has not yet been identified and no permits have been granted for the purpose of landfilling the PCB contaminated wastes. Detailed engineering and cost proposals for the potential disposal sites will not be prepared by landfill owners participating in the bid process until the volume and composition of the PCB contaminated materials is specified in greater detail. The development of this information requires further field study in the North Ditch area. The specific environmental impacts associated with the construction and operation of a final disposal site will be addressed when the recommended site is selected and the permitting process undertaken. The final disposal site will fulfill all applicable Federal and state licensing and permitting procedures, thus ensuring secure and environmentally acceptable ultimate disposal of the contaminated material.

Noise would be produced by construction, dredging and transportation activities. Although high noise levels could occur in localized areas on a periodic basis, particularly during construction activities, noise impacts would be of relatively short duration.

Construction of the dewatering lagoon and the final disposal site will modify the topography of the two areas. These physical changes are not expected to create any adverse environmental impacts. The final disposal site could have an annoying aesthetic impact on adjacent areas. The removal of contaminated soils from the North Ditch Drainage System would provide for future development in this area. Conversely, the establishment of a final disposal site for contaminated materials will preclude the use of several acres of soil in another location for agricultural production or residential development.

The impacts on groundwater associated with the project alternatives include the possible leakage of PCB contaminated water from the dewatering lagoon into the underlying soils and ultimately into the groundwater. A trial flooding of the lagoon with clean water is proposed to identify and repair cracks, gaps, or other anomalies in the clay liner before any contaminated sediments are placed in the lagoon. Similar impacts are possible at the ultimate disposal site. However, because Federal and state regulations require proper safety systems to protect the groundwater at disposal sites, no adverse impacts are expected.

The quality of the surface water would be improved from implementation of the action alternatives. The removal of PCB contamination from the northern third of the Harbor (Alternative 2) would result in a complete elimination of the long term average, annual rate of movement to the Lake of PCBs now in the Harbor. If Alternatives 3, 4 or 5 were implemented, nearly all of the existing PCB movement from the Harbor and the North Ditch area into Lake Michigan would cease.

Reductions in PCB concentrations in the water column of the Harbor would result from Alternative #2 and would have a beneficial impact on aquatic biota. If no action is taken to abate the PCB contamination in the project

The construction of the dewatering lagoon could cause roadway damage, create roadway congestion, and pose pedestrian safety problems in the Harbor area. Traffic congestion also could result from the transport of materials to the ultimate disposal site.

If no action is taken to abate PCB contamination, fishing from the Harbor breakwater likely would decrease and the nearby sport trolling fishery also may decrease (including charter boat operations). Conversely, the removal of PCB contaminated Harbor sediments would have a positive impact on the total recreational fishery. The construction activities associated with the project alternatives would produce noise, dust and traffic congestion that could diminish people's enjoyment of the public beach adjacent to the project area.

The potential adverse impacts associated with the action alternatives can largely be minimized or eliminated with appropriate mitigative techniques. The dredging and disposal of Waukegan Harbor sediments (Alternative #2) is a recommended component of all of the action alternatives and requires the most extensive mitigative measures to prevent adverse impacts. The most important mitigative measure that is proposed is the deployment of a double-walled silt curtain across the southernmost boundary of the Harbor dredging area. Deployment of the silt curtain would prevent the transport of PCBs out of the dredging area.

Several mitigation measures also are proposed to reduce PCB volatilization during dredging and sediment dewatering. These include capping the contaminated sediments with an organic-rich cover material after they are removed from the Harbor, supplying project personnel with protective clothing, scheduling dredging activities to avoid periods of heavy beach use, and surrounding and covering heavily contaminated materials in the lagoon with less contaminated Harbor sediments. Impacts associated with lagoon construction and operations could be minimized with proper equipment maintenance, noise suppression devices, adjustment of daylight working hours, and dust control measures.

The transport of PCB-contaminated materials from the project area to the ultimate disposal site creates a potential for non-localized impacts. These could be reduced by the use of suitable transportation routes and scheduling



abatement action in the North Ditch area are the projected rate of PCB dispersal and the costs to society of an uncontrolled and massive amount of a toxic substance residing in an urban setting. The selection of a recommended project alternative rests primarily on a comparison between the public health benefits that would be derived from a particular action versus the costs associated with that action. The anticipated benefits of abating PCB contamination in the Harbor are thought to outweigh the costs associated with that action. The determination of the benefits and costs of abatement options for the North Ditch Drainage System will be made when more detailed information is available.